

Crop Survey for Estimation/Assessment of Acreage, Crop Health and Expected Yield of Basmati Rice during Kharif-2023

Volume: III



Submitted To:

Basmati Export Development Foundation

Agricultural & Processed Food Products Export Development Authority,
Ministry of Commerce, Govt. of India, NCUI Building,
3, Siri Institutional Area, August Kranti Marg,
New Delhi 110 016



Submitted By:

LeadsConnect Services Pvt. Ltd.

1601, 16th Floor, World Trade Tower,
Plot No. C-001, Sector-16, Noida (U.P.) 201301
Tel: 0120 4573 110

Contents

1. Executive Summary:	3
2. Introduction:	5
3. Objective and Scope of work:	6
4. Study Area:	7
5. Approach & Methodology:	8
6. Results:	10
Variety wise Basmati Acreage- Punjab:	11
Variety wise Basmati Acreage-Haryana:	12
Variety wise Basmati Acreage- Uttar Pradesh:	13
Variety wise Basmati Acreage-Uttarakhand:	14
Variety wise Basmati Acreage-Himachal Pradesh:	15
Variety wise Basmati acreage-Jammu & Kashmir:	16
7. Rainfall Status:	17
8. Field Survey:	24
• Punjab	26
Field Photographs collected during Field Survey:	26
• Haryana	29
Field Photographs collected during Field Survey:	29
• Uttar Pradesh	32
Field Photographs collected during Field Survey:	32
9. Schedule wise Report Status:	34

1. Executive Summary:

- The scope of present report (Volume-III) is to provide field and satellite data-based Basmati varieties acreage estimates in GI areas.
- The study area covers a total of 85 districts, which includes 23 districts of Punjab, 30 districts of Uttar Pradesh, 22 districts of Haryana, 3 Districts of Jammu & Kashmir, 4 districts of Uttarakhand, 2 districts of Himachal Pradesh and NCT of Delhi.
- The present report is being submitted on the basis of Remote Sensing and field survey based analysis done with the help of satellite images procured from July-2023 to September-2023.

State wise Basmati Variety Acreage (000 Ha)							
States	Basmati Area (000' ha)	PB 1121, PB 1718, PB 1885	PB 1509, PB 1692, PB 1847	PB 1401, PB 01, PB 06, PB 1882	CSR 30, HBC 19, B 370	Sharbati	Sugandha
Punjab	812.39	469.64	198.61	144.34			
Haryana	787.60	478.15	196.44	99.95	13.51	5.34	
Uttar Pradesh	461.74	25.68	249.79	6.27		126.65	23.60
Uttarakhand	19.35	12.72	5.37		1.23	11.76	
Jammu & Kashmir	46.61	4.76			41.85	14.73	
Himachal Pradesh	7.62		6.37		1.25		
Grand Total	2135.31	990.95	656.58	250.56	57.84	158.48	23.60

- Satellite data and field survey observation base study was carried out for estimation of Basmati varieties acreage. The state of Punjab has the most land planted with basmati, which is around 812.39 thousand hectares, followed by Haryana with 787.60 thousand hectares, and Uttar Pradesh, which has 461.74 thousand hectares. The targeted districts in Uttarakhand, Jammu & Kashmir and Himachal Pradesh have basmati rice acreages of 19.35, 46.61, and 7.62 thousand hectares, respectively.
- A field Survey was conducted from 21st July to 24th September in all the districts of Punjab, Haryana, Uttarakhand, J&K and Uttar Pradesh. During the field survey it was observed that major Basmati Rice transplanting is done in the month of July till 2nd fortnight of August. In some of the areas where the impact of flood is observed re-transplanting of paddy is also observed.
- The most sown Basmati varieties in the study area are (PB1121, PB1718, PB1885), (PB1509, PB1692, PB1847), and (PB1401, PB01, PB06). Sharbati and Sugandha majorly found in Some districts of UP and Haryana. (CSR 30, PB370, HBC19) is also observed at some places in study areas.

State wise Basmati Variety Acreage (000 ha)			
States	Basmati Area 2023	Basmati Area 2022	% Deviation
	(000' ha)	(000' ha)	
Punjab	812.39	637.4	22%
Haryana	787.6	678.35	14%
Uttar Pradesh	461.74	314.18	32%
Uttarakhand	19.35	16.88	13%
Jammu & Kashmir	46.61	46.96	-1%
Himachal Pradesh	7.62	6.15	19%
Grand Total	2135.31	1699.92	20%

- According to the comparison from last year, as indicated in the table below, the Basmati area has expanded by 20% in the study region. In comparison to other states, Uttar Pradesh's 32% increase in the Basmati area is the highest. The total Basmati Area is observed as 21.35 lakh hectare.
- Based on the rainfall recorded so far, excessive rainfall is observed throughout the study area. In Punjab and Haryana states excess rainfall conditions are seen in districts located in north-east parts. Very few districts of Uttar Pradesh received normal rainfall while most of the districts are received excess rainfall in Uttar Pradesh. Basmati districts of J&K and Uttarakhand also received excess rainfall. Basmati districts of Himachal Pradesh also witnessed heavy rainfall conditions.
- It is also observed that, Paddy crop area has increased while cotton crop area has decreased in the states of Punjab and Haryana. The paddy area has specifically decreased near the flood prone area of rivers.
- During the field visit, few traditional old variety of Basmati is also observed specially in Muktsar and Malarkot.
- The crop condition is good in the study area except there may be an exception where re-transplanting of Basmati varieties has been done. No Major disease & Pest infestation is observed in the study area.

2. Introduction:

Among the food grains exported from India, basmati rice is a significant export product. Basmati rice is mostly farmed in India for export. a significant amount of money was made from exporting this fragrant rice product. The majority of the world's basmati rice production and exports come from India. It produces 75% of the world's basmati rice. Every year, India exports Basmati to close to 132 nations. Iran, Saudi Arabia, the United Arab Emirates, and Iraq are the main importers of these. For exporters and farmers alike, timely information regarding crop acreage, crop health, and crop varietal distribution may be essential in this situation. It aids exporters and other Basmati trade decision-makers in making judgements on the quantity and timeline.

Basmati rice is the most costly product in the world since its price is mostly set and it commands high rates on the worldwide market. Basmati rice is increasingly becoming the choice across consumer groups mainly because of its superior taste and aroma that is highly pleasing to the senses. India now has a fantastic chance to export Basmati rice to other nations. There are many downstream applications for basmati rice, and recently, deep processing and direct edible uses have elevated basmati rice to a more prominent position. The primary factor propelling the basmati rice market globally is the rise in demand for Direct Edible.

LeadsConnect services Pvt. Ltd. is working with BDEF for the estimation/assessment of acreage, crop health and expected yield of Basmati rice during 2022 and 2023. Basmati occupies a special status in Rice cultivation. It is a variety of long, slender grained, aromatic rice. In India, Basmati rice is grown in the specific geographical area, at the Himalayan foot-hills confined into few states of India. As part of scope, Basmati survey to be carried out in seven area viz., Punjab, Haryana, Himachal Pradesh, Uttarakhand, Delhi, Western UP and J&K. These states are located at northern parts of our country.

Keeping this in view, the Basmati Export Development Foundation (BEDF), New Delhi awarded M/s. LeadsConnect services Pvt. Ltd. the work of Crop Survey for estimation/assessment of acreage, crop health and expected yield of Basmati rice during 2023. This will include the all basmati rice crop varieties differentiated in traditional and evolved varieties of Basmati rice and Sharbati and Sugandha varieties of Non- Basmati. Survey will be attempted through the satellite imageries and field based methods for assessment of acreage, crop health and yield of Basmati rice during Kharif 2023.

The use of Satellite Image based Remote Sensing and GIS technique offers an effective system for monitoring crops, its type, Crop health and acreage estimation at large spatial extent. The remote sensing based solution is relatively quick, affordable, and more successful. Additionally, remote sensing sensors are a great option for retrieving temporal information about crop phenology, plant health (stress), response to weather, and soil nutrients (such as manure and fertilizer) due to their repetitive data acquisition capabilities. Monitoring agricultural crops and export vegetation phenology is made possible by the free availability of optical remote sensing data from Sentinel-2 satellites with multiple

spectral bands in the red, red edge, and near infrared (NIR).

The present study has been conducted for area, production and productivity of basmati rice of India. The nature of data used for study is based on the Remote sensing, field-based study and secondary data collected from different sources from public domain.

The present report gives the estimates of field survey and satellite image-based analysis of acreage of Basmati rice, crop health and information of Basmati varieties along with other non-notified selected varieties present in field during survey.

3. Objective and Scope of work:

The major objective of the project can be listed as:

1. “Field based survey to be carried out on the basis of sample group of farmers selected at district level in seven GI area states viz., Punjab, Haryana, Himachal Pradesh, Uttarakhand, Delhi, Western UP and J&K”.
2. To provide Remote Sensing based estimation of Crop Area, Crop Health and Production estimate of notified Basmati Rice varieties.

The scope of work which included satellite images and field-based survey will cover the following activities:

1. Acreage estimation of all basmati rice crop varieties differentiated in traditional and evolved varieties of Basmati rice and Sharbati and Sugandha varieties of non-Basmati. Reports will be submitted on district level basis for each state.
2. Variety-wise Crop Health Monitoring and Analysis.
3. Variety-wise Crop maturity survey, describing the percentage of acreage under particular crop growth.
4. Climate based yield modeling using historical yield and climate data (10 years) in order to predict yield well in advance.
5. Questionnaire based sample survey of farmers for area/districts mentioned above with a suitable sample size covering all blocks of the respective districts. The sample size may be arrived at, taking in to view the crop density in the concerned block. The contact details of the farmers included in the survey may be provided. Reports to mention as to how many farmers and how much crop area has been covered from each block/district.
6. Percentage-wise sale/distribution of basmati seeds by different agencies including Govt. sources, private sector for each variety. This information should be contained in report for the month of July.
7. Crop cutting experiments in sample areas for yield estimation.

4. Study Area:

The study area includes total 85 districts of Basmati rice and non-Basmati rice (Sharbati and Sugandha), which includes number of Districts

- Punjab-23,
- Uttar Pradesh-30,
- Haryana-22,
- Jammu & Kashmir-3,
- Uttarakhand-4,
- Himachal Pradesh-2

The map of the entire study area including all districts in the designated States is being given below:

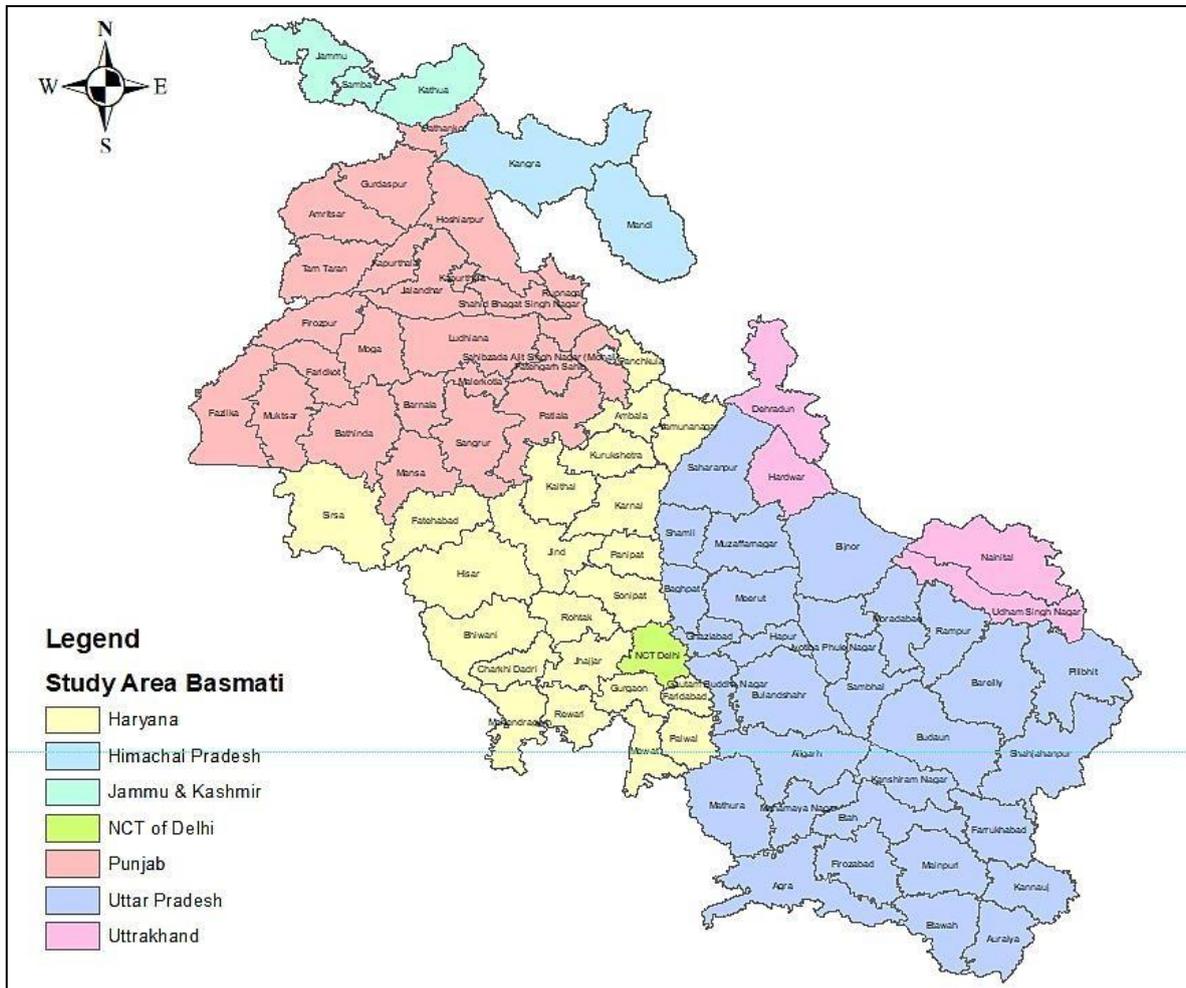


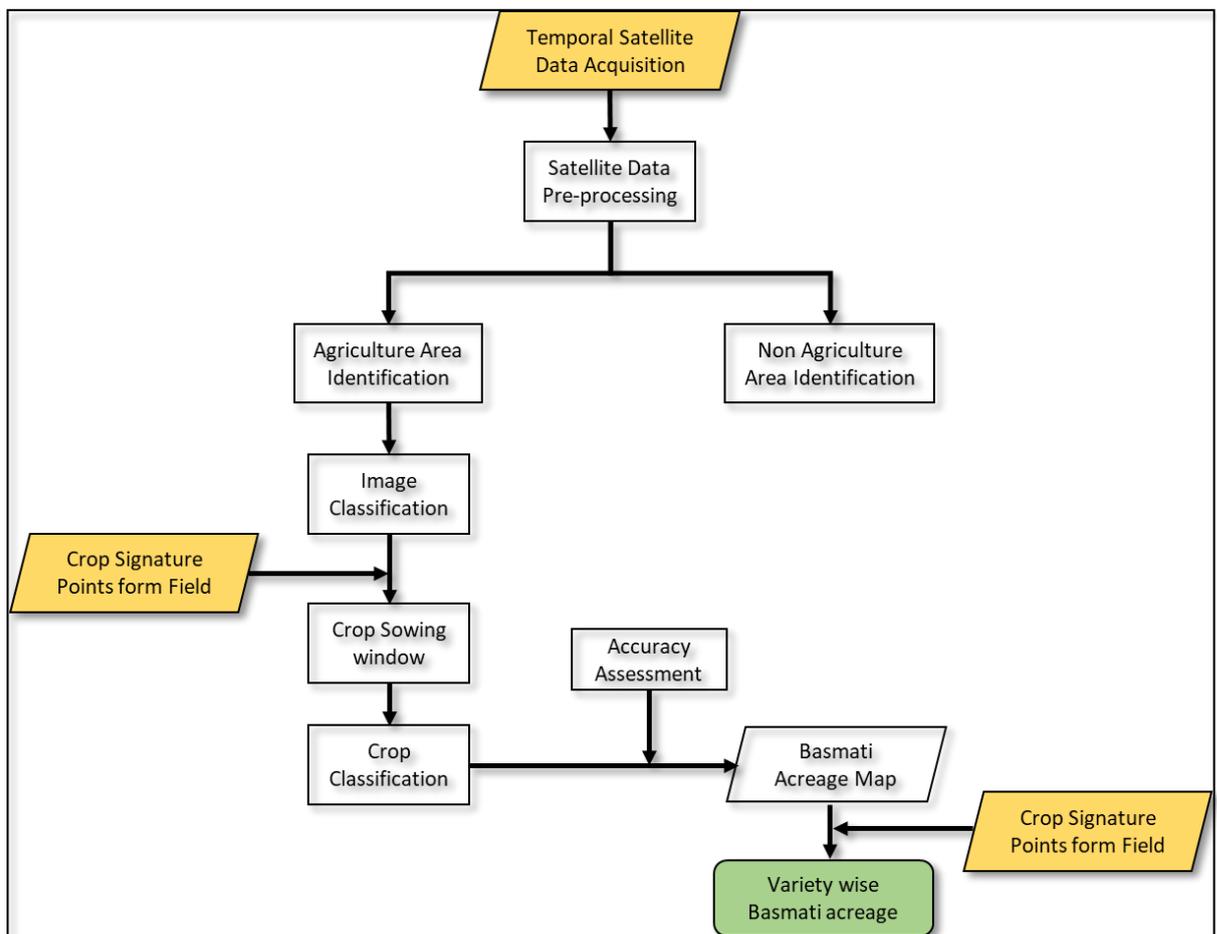
Fig. 1: Project Study area

5. Approach & Methodology:

• Variety wise Basmati Rice Acreage Estimation:

Remote sensing-based approach supported with field-based survey input is used for current study. The following methodology is used for variety wise Basmati acreage estimation which is depicted in the process flow given below:

Fig. 2: Crop classification using remote sensing



The details of the adopted methodology can be summarized as below:

- Temporal data of sentinel-2 (Optical) during the cropping period was used for remote sensing based crop variety acreage estimation. SAR data was also used where optical data was not available for estimation of varieties. Date range which is used for variety acreage estimation of Basmati is given in table:

State	Satellite Data Used	SAR - Data Duration	Optical - Data Duration
Punjab	Optical Sentinel-2 and Temporal Sentinel-1 SAR	28 th June to 24 th Sept	Optical Satellite Data (10 th June – 21 st Sept)
Haryana	Optical Sentinel-2 and Temporal Sentinel-1 SAR	27 th June to 19 th Sept	Optical Satellite Data (10 th June – 21 st Sept)
Uttar Pradesh	Optical Sentinel-2 and Temporal Sentinel-1 SAR	20 th June to 26 th Sept	Optical Satellite Data (13 th June - 18 th Sept)
Uttarakhand	Optical Sentinel-2 and Temporal Sentinel-1 SAR	29 th June to 26 th Sept	Optical Satellite Data (05 th June - 18 th Sept)
Jammu & Kashmir	Optical Sentinel-2 and Temporal Sentinel-1 SAR	29 th June to 19 th Sept	Optical Satellite Data (10 th June - 18 th Sept)
Himachal Pradesh	Optical Sentinel-2 and Temporal Sentinel-1 SAR	22 nd June to 26 th Sept	Optical Satellite Data (10 th June - 18 th Sept)

- Pre-processing of satellite data was performed, and all necessary corrections applied to remove noise in satellite data. FCC was generated using temporal dates for better interpretation.
- Non- agriculture area was removed using latest available optical satellite data.
- To achieve the accuracy of crop classification, a field survey is conducted during 21st July to 26th September 2023 in different districts of Haryana, Punjab and Uttar Pradesh. During field survey, estimation of sowing, GCP point collection for crop signature, field photographs and discussion-based crop condition was assessed. This information was used for the finalization of variety wise acreage in study area.
- Image classification was performed using suitable software and reliable ground truth information to get the area statistics of rice.
- Ancillary data collected from different sources were also used for Basmati area validation.

6. Results:

- **Satellite Image and Field based variety wise Basmati Acreage**

Basmati acreage estimation was done using hybrid approach. Sentinel-1 (SAR) data and Sentinel-2 Optical data was used for classification of varieties of Basmati Rice with the help of GCP, sowing period and other ground truth information collection during field in study area.

Estimated Basmati acreage in Punjab is about 812.39 thousand hectares, followed by Haryana (787.60) and Uttar Pradesh (461.74). The basmati acreage in targeted districts of Jammu & Kashmir, Uttarakhand and Himachal Pradesh is 46.61, 19.35 and 7.62 thousand hectares respectively. State wise acreage map and area statistics is given below for each state.

State wise Basmati Variety Acreage							
States	Basmati Area (000' ha)	PB 1121, PB 1718, PB 1885	PB 1509, PB 1692, PB 1847	PB 1401, PB 01, PB 06, PB 1882	CSR 30, HBC 19, B 370	Sharbati	Sugandha
Punjab	812.39	469.64	198.61	144.34			
Haryana	787.60	478.15	196.44	99.95	13.51	5.34	
Uttar Pradesh	461.74	25.68	249.79	6.27		126.65	23.60
Uttarakhand	19.35	12.72	5.37		1.23	11.76	
Jammu & Kashmir	46.61	4.76			41.85	14.73	
Himachal Pradesh	7.62		6.37		1.25		
Grand Total	2135.31	990.95	656.58	250.56	57.84	158.48	23.60

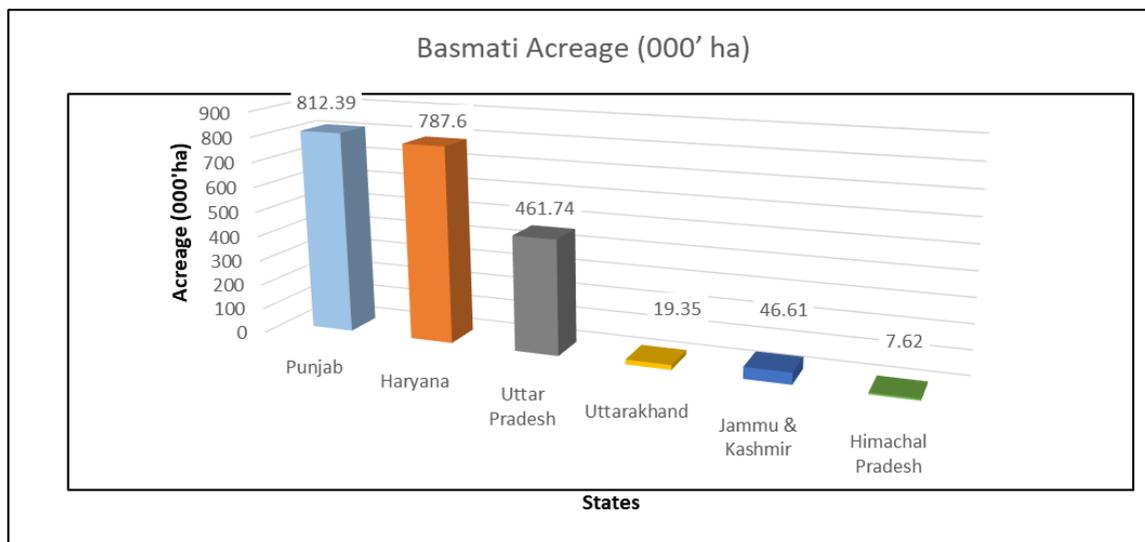


Fig. 3: State wise Basmati Rice Acreage.

Variety wise Basmati Acreage- Punjab:

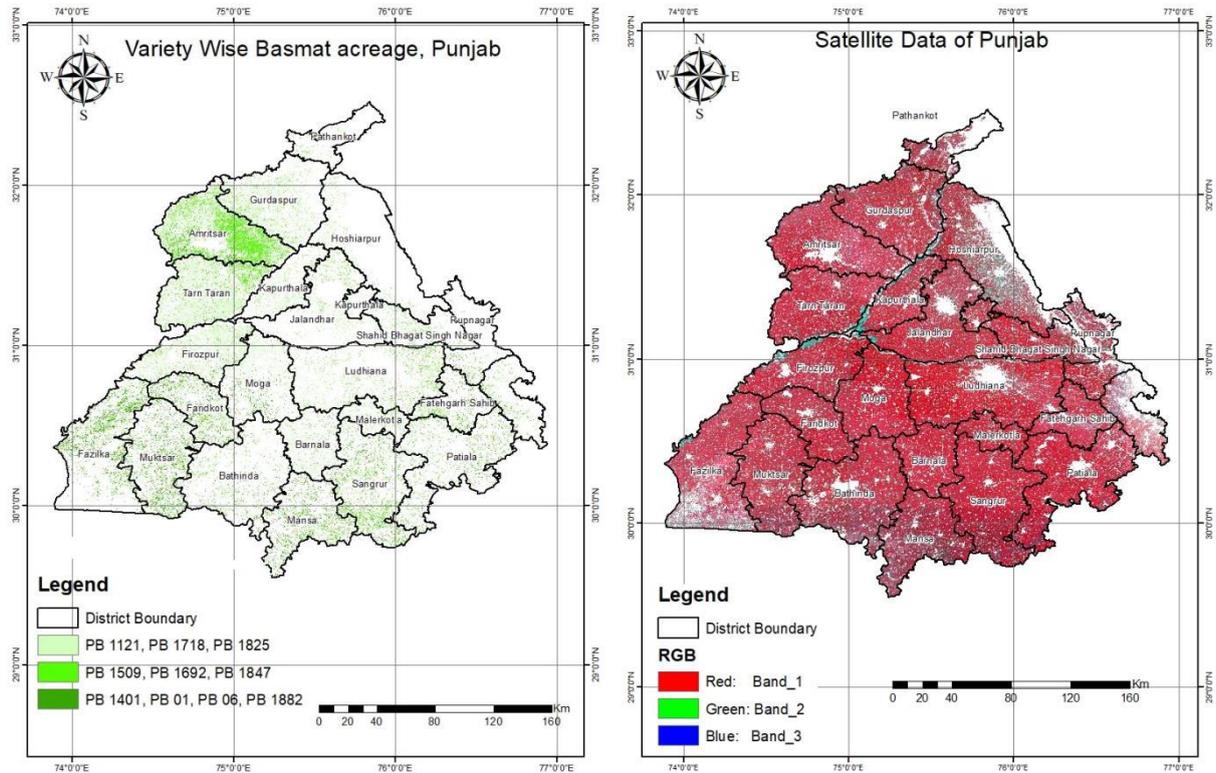


Fig. 4: Variety wise Basmati acreage map and satellite data, Punjab

Satellite data and field-based Variety wise Basmati acreage (000' ha) detail of Punjab						
S. No.	State Name	District Name	Basmati Acreage (000' ha)	PB 1121, PB 1718, PB 1885	PB 1509, PB 1692, PB 1847	PB 1401, PB 01, PB 06, PB 1882
1	Punjab	Amritsar	126.38	53.25	65.87	7.25
2		Barnala	2.22	16.33	2.34	1.83
3		Bathinda	23.47	1.39	7.19	5.88
4		Faridkot	37.47	19.82	3.89	13.85
5		Fatehgarh Sahib	14.77	6.57	4.29	4.42
6		Fazilka	64.24	32.97	2.45	28.86
7		Ferozpur	51.12	42.11	6.23	2.77
8		Gurdaspur	46.27	35.59	1.69	
9		Hoshiarpur	11.52	9.44	2.83	
10		Jalandhar	21.28	15.34	5.94	
11		Kapurthala	2.86	17.23	3.64	
12		Ludhiana	38.77	22.38	14.29	2.17
13		Malerkotla	1.93	8.45	2.48	
14		Mansa	36.61	13.65	6.74	15.67
15		Moga	29.10	2.61	2.75	6.96
16		Muksar	55.73	27.72	2.16	25.85
17		Pathankot	3.79	2.27	1.53	
18		Patiala	29.75	8.99	11.39	9.37
19		Rupnagar	6.70	3.56	0.78	2.35
20		SAS Nagar (Mohali)	11.21	6.39	2.92	1.94
21		Sangrur	54.41	25.62	16.54	12.29
22		Shahid Bhagat Singh Nagar	11.22	6.48	5.17	
		Tarn Taran	86.79	66.36	17.52	2.91
Total			812.39	469.64	198.61	144.34

The acreage of Basmati Rice is observed in Punjab which is of 812.39 thousand hectares. In Punjab highest acreage of sown varieties are (PB1121, PB1718, PB1885) followed by (PB1509, PB1692, PB1847). The other varieties are found in comparatively lower quantity and Sharbati and Sugandha varieties are not found in

noticeable amount.

Variety wise Basmati Acreage-Haryana:

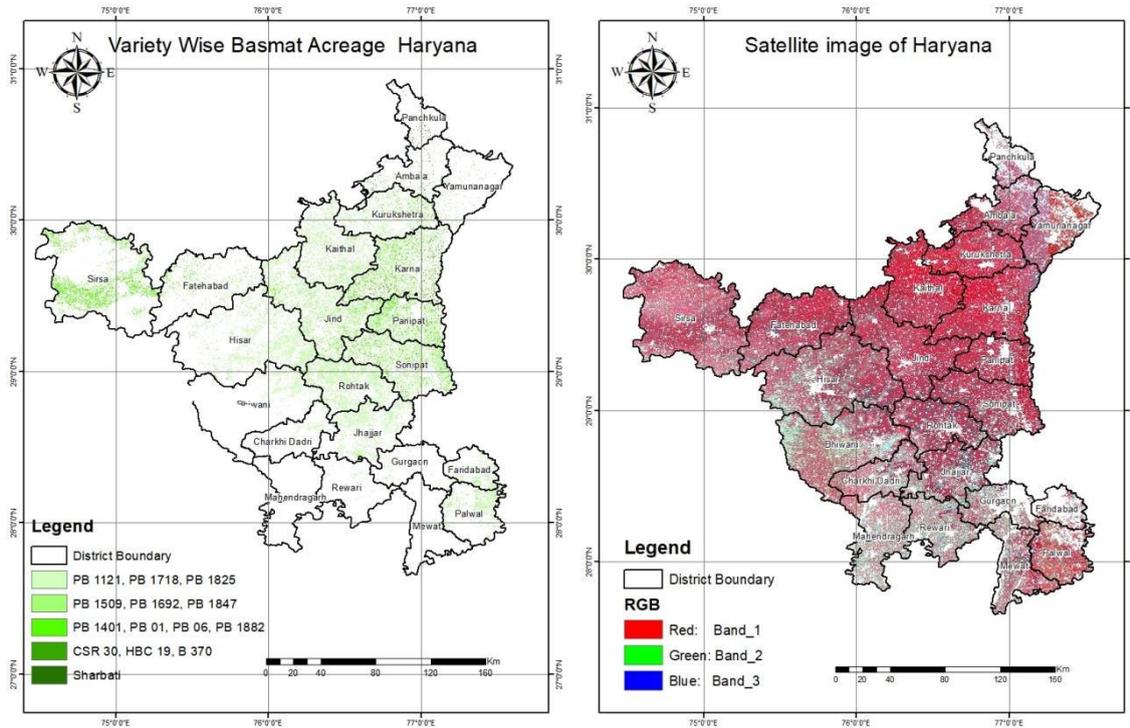


Fig. 5: Variety wise Basmati acreage map and satellite data, Haryana

Satellite data and field-based Variety wise Basmati acreage (000' ha) details of Haryana								
S. No.	State Name	District Name	Basmati Acreage (000' ha)	PB 1121, PB 1718, PB 1885	PB 1509, PB 1692, PB 1847	PB 1401, PB 01, PB 06, PB 1882	CSR 30, HBC 19, B 370	Sharbati
1		Ambala	13.60	8.88	4.71			1.83
2		Bhiwani	21.73	21.73				
3		Charkhi Dadri	7.14	5.94	1.19			
4		Faridabad	9.16	3.53	5.49			
5		Fatehabad	22.67	1.38	7.48	4.81		
6		Gurgaon	3.32	1.73	1.59			
7		Hisar	67.23	47.95	15.74	3.54		
8		Jhajjar	46.78	41.11	5.67			
9		Jind	93.15	63.54	14.38	15.24		
10		Kaithal	58.62	28.77	26.57	3.27		
11		Karnal	75.61	34.33	21.92	14.24	5.15	
12		Kurukshetra	43.96	28.67	9.46	3.76	2.67	
13	Haryana	Mahendragarh						
14		Mewat	5.16	3.86	1.30			0.57
15		Palwal	22.24	12.34	9.90			
16		Panchkula	0.30				0.30	0.76
17		Panipat	63.87	37.46	17.72	5.15	3.59	
18		Rewari	3.90	3.22	0.68			
19		Rohtak	67.93	52.43	15.53			
20		Sirsa	75.84	28.32	8.36	39.23		
21		Sonapat	8.23	43.26	25.91	9.76	1.95	
22		Yamunanagar	5.39	0.78	2.93	1.68		2.19
		Total	787.60	478.15	196.44	99.95	13.51	5.34

In Haryana, there are 787.60 thousand hectares of basmati rice planted. The cultivars with the most acres sown in Haryana are PB1121, PB1718, PB1885, followed by PB1509, PB1692, PB184 with the exception of the Sugandha variety, which is fairly rare, the other varieties are all present in lower quantity.

Variety wise Basmati Acreage- Uttar Pradesh:

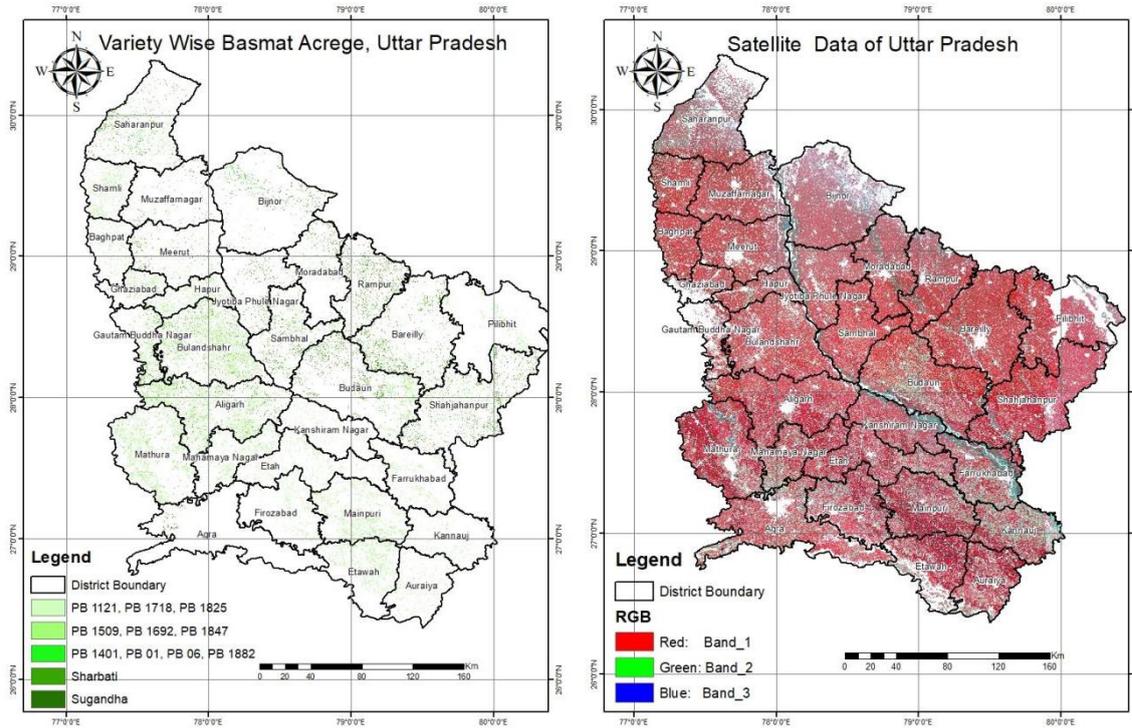


Fig. 6: Variety wise Basmati acreage map and satellite data, Uttar Pradesh

Satellite data and field-based Variety wise Basmati acreage (000' ha) detail of Uttar Pradesh									
S. No.	State Name	District Name	Basmati Acreage (000' ha)	PB 1121, PB 1718, PB 1885	PB 1509, PB 1692, PB 1847	PB 1401, PB 01, PB 06, PB 1882	CSR 30, HBC 19, B 370	Sharbati	Sugandha
1	Uttar Pradesh	Agra	1.69	1.69					1.41
2		Aligarh	69.62	38.63	3.99			9.88	
3		Auraiya	9.72	4.70	5.32				
4		Baghpat	6.38	2.37	4.11				
5		Bareilly	9.33	4.18	5.15			18.54	
6		Bijnor	5.68	1.32	2.24	1.58		6.47	3.25
7		Budaun	12.23		12.23			9.12	
8		Bulandshahr	6.57	17.85	43.42			9.95	7.54
9		Etah	16.13	11.45	4.68				
10		Etawah	24.21	1.65	13.38				
11		Farrukhabad	9.88	4.15	5.73				
12		Firozabad	11.42	7.90	3.52				
13		Gautam Buddha Nagar	17.85	13.46	4.39			3.17	1.13
14		Ghaziabad	12.29	7.12	5.17			0.52	
15		Hapur	15.22	5.85	9.37				
16		Jyotiba Phule Nagar	2.58	1.25	1.33			6.36	2.15
17		Kannauj	6.23	4.73	1.53				
18		Kanshiram Nagar	8.18	5.62	2.56				
19		Mahamaya Nagar	15.47	4.20	11.45				
20		Mainpuri	35.35	22.27	13.87				
21		Mathura	37.59	1.60	27.59			1.46	3.58
22		Meerut	9.46	6.61	2.37	0.49		0.99	2.39
23		Moradabad	2.44		2.44			4.74	
24		Muzaffarnagar	3.93	0.88	1.77	1.29		1.77	
25		Pilibhit	7.54	1.89	5.65				
26		Rampur	3.25	1.13	2.13			15.40	

27	Saharanpur	12.74	2.76	6.95	2.99	6.46	
28	Sambhal	7.61		7.61		9.99	
29	Shahjahanpur	14.60	8.59	6.10		21.39	2.15
30	Shamli	14.16	5.44	8.58		1.83	
Total		461.74	25.68	249.79	6.27	126.65	23.60

Uttar Pradesh has 461.74 thousand hectares of Basmati rice acreage. The varieties like PB1509, PB1692, PB1847 have been planted on most of the areas in Haryana, followed by PB1121, PB1718, PB1885. The state has considerable amounts of the Sharbati and Sugandha types, while the other kinds of Basmati are found in small numbers.

Variety wise Basmati Acreage-Uttarakhand:

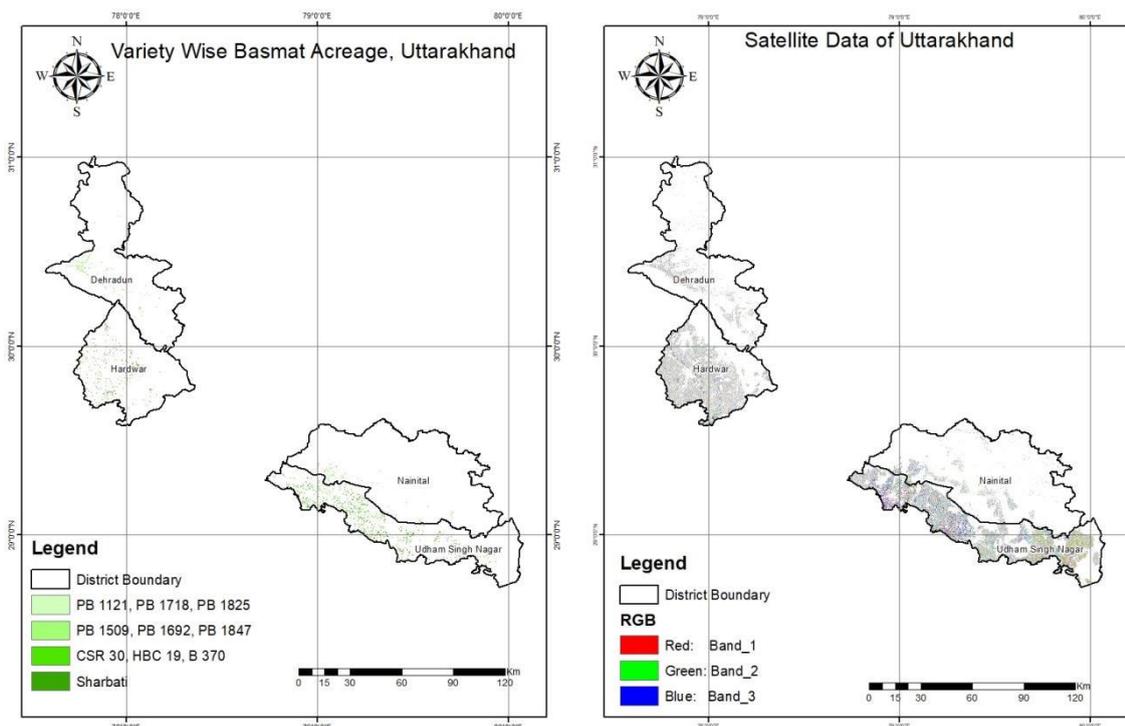


Fig. 7: Variety wise Basmati acreage map and satellite data, Uttarakhand

Satellite data and field-based Variety wise Basmati acreage (000' ha) detail of Uttarakhand								
S. No.	State Name	District Name	Basmati Acreage (000' ha)	PB 1121, PB 1718, PB 1885	PB 1509, PB 1692, PB 1847	PB 1401, PB 01, PB 06, PB 1882	CSR 30, HBC 19, B 370	Sharbati
1	Uttarakhand	Dehradun	2.15		1.67		0.48	
2		Hardwar	3.57	2.66	0.99			3.66
3		Nainital	2.97	2.22			0.75	
4		Udham Singh Nagar	1.62	7.83	2.80			8.12
Total			19.35	12.72	5.37		1.23	11.76

The acreage of Basmati Rice is observed in Uttarakhand which is of 19.35 thousand hectares. In Uttarakhand the acreage of sown varieties of (PB1121,PB1718,PB1885) is higher than (PB1509,PB1692, PB1847).The Sharbati variety covers 11.76 thousand hectares, whereas the other types are significantly less common. Sugandha variety is not found in noticeable amount in the state.

Variety wise Basmati Acreage-Himachal Pradesh:

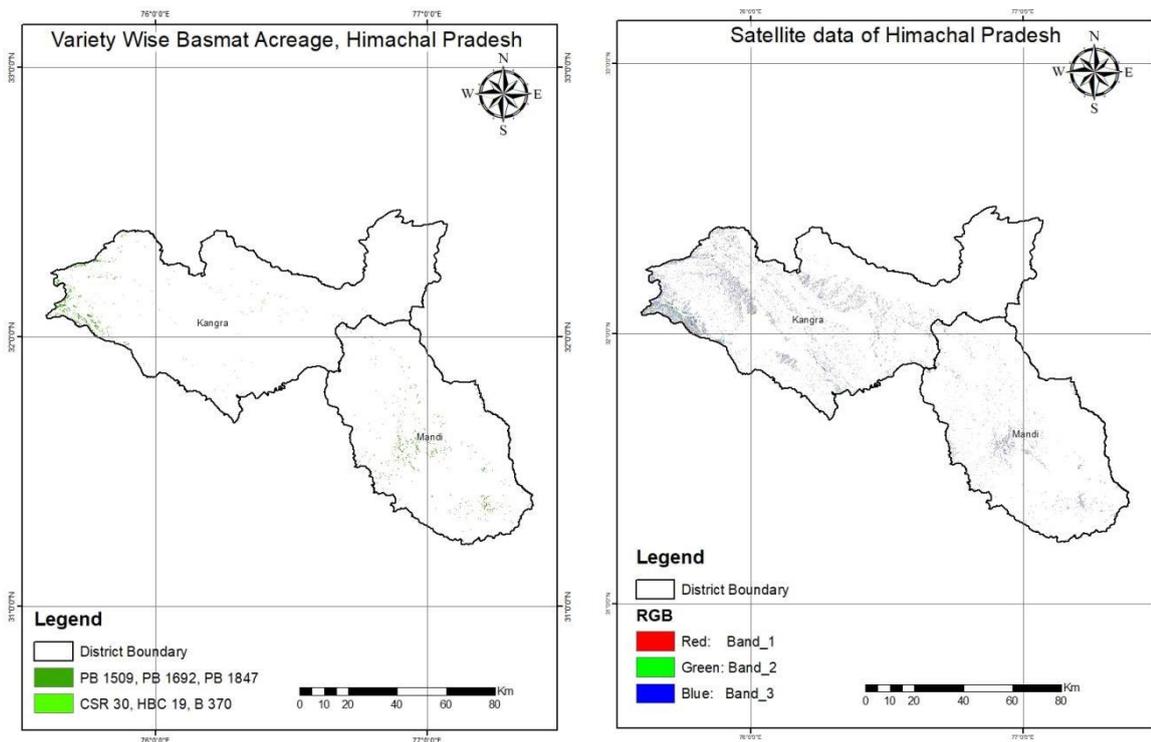


Fig. 9: Variety wise Basmati acreage map and satellite data, Himachal Pradesh

Satellite data and field-based Variety wise Basmati acreage (000' ha) detail of Himachal Pradesh							
S. No.	State Name	District Name	Basmati Acreage (000' ha)	PB 1121, PB 1718, PB 1885	PB 1509, PB 1692, PB 1847	PB 1401, PB 01, PB 06, PB 1882	CSR 30, HBC 19, B 370
1	Himachal Pradesh	Kangra	3.97		2.72		1.25
2		Mandi	3.65		3.65		
Total			7.62		6.37		1.25

The acreage of Basmati Rice is observed in Himachal Pradesh which is of 7.62 thousand hectares in which PB1509,PB1692,PB1847 varieties are dominantly reported. The other varieties are found in comparatively lower quantity while Sharbati and Sugandha varieties are not reported in the state.

Variety wise Basmati acreage-Jammu & Kashmir:

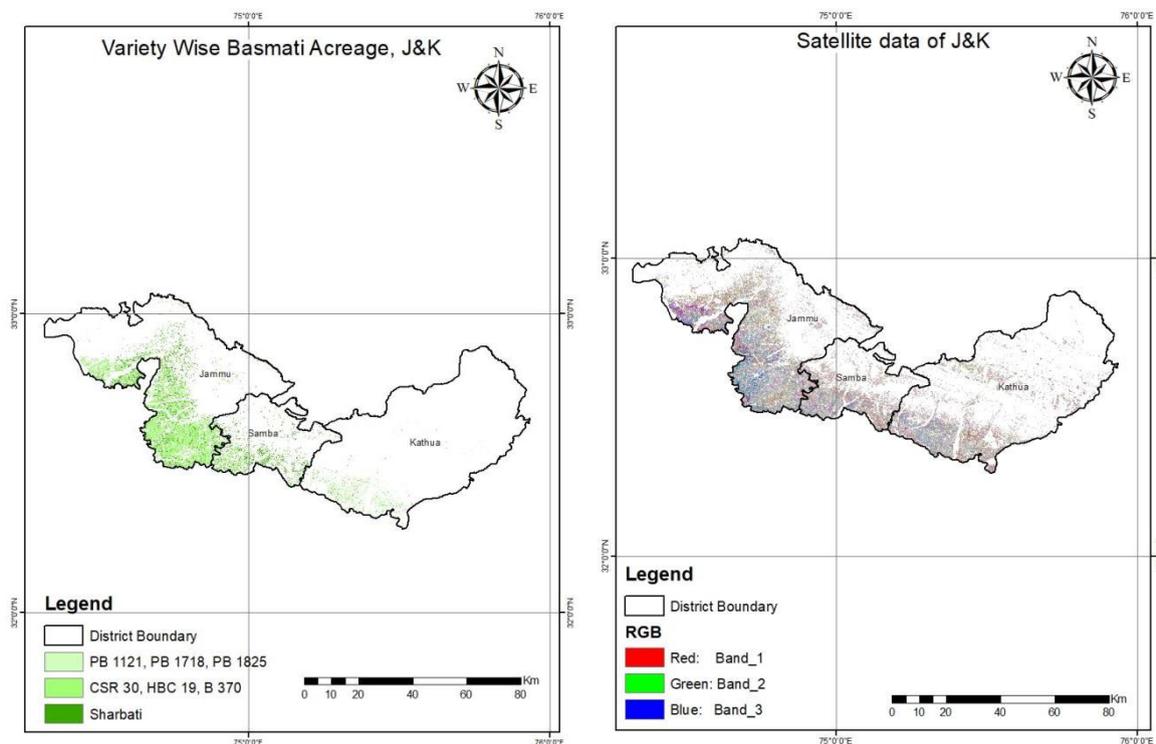


Fig. 8: Variety wise Basmati acreage map and satellite data, Jammu & Kashmir

Satellite data and field-based Variety wise Basmati acreage (000' ha) detail of Jammu & Kashmir								
S. No.	State Name	District Name	Basmati Acreage (000' ha)	PB 1121, PB 1718, PB 1885	PB 1509, PB 1692, PB 1847	PB 1401, PB 01, PB 06, PB 1882	CSR 30, HBC 19, B 370	Sharbati
1	Jammu & Kashmir	Jammu	35.66				35.66	9.65
2		Kathua	6.42	4.76			1.66	0.69
3		Samba	4.53				4.53	4.47
Total			46.61	4.76			41.85	14.73

In J&K the acreage of Basmati Rice is observed around 46.61 thousand hectares in which **CSR 30, HBC19, B370 varieties are dominant**. The next found variety is Sharbati which covers 14.73 thousand-hectare area. Sugnadha is not reported from the state.

7. Rainfall Status:

- As per the rainfall observed till date, normal rainfall is observed in western part of Haryana while excessive rain conditions seen in Eastern part. Excess rainfall conditions seen in districts located in north-east parts of Punjab while rainfall is normal in districts of South-East part.
- Excess rainfall has been observed in all districts of Uttar Pradesh. Very few districts received normal rainfall while most of the districts have excess rainfall condition in Uttar Pradesh.
- In first and third week of August heavy rainfall was observed in many districts of Uttar Pradesh. Overall normal to excess rainfall conditions are seen in State.
- In Uttarakhand, <500 mm rainfall is departed in area of basmati districts. Basmati districts of Himachal Pradesh is showing the excess rainfall conditions.
- As per the rainfall received till date, excess rainfall conditions were observed in Basmati districts of J&K.
- In September month, good amount of rainfall departed in Uttar Pradesh and Uttarakhand during 2nd week. Punjab and Himachal Pradesh also witnessed rainfall departure in 3rd week of September.
- Cumulative rainfall conditions from 1st of June to 27th of September 30, 2023 are presented in below figures.

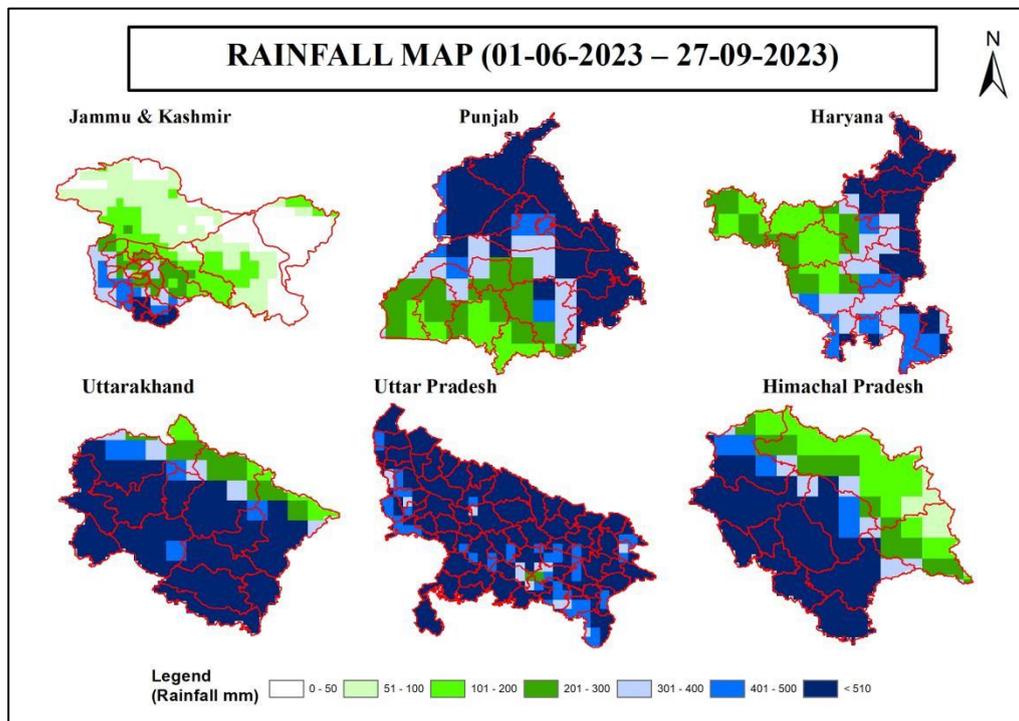
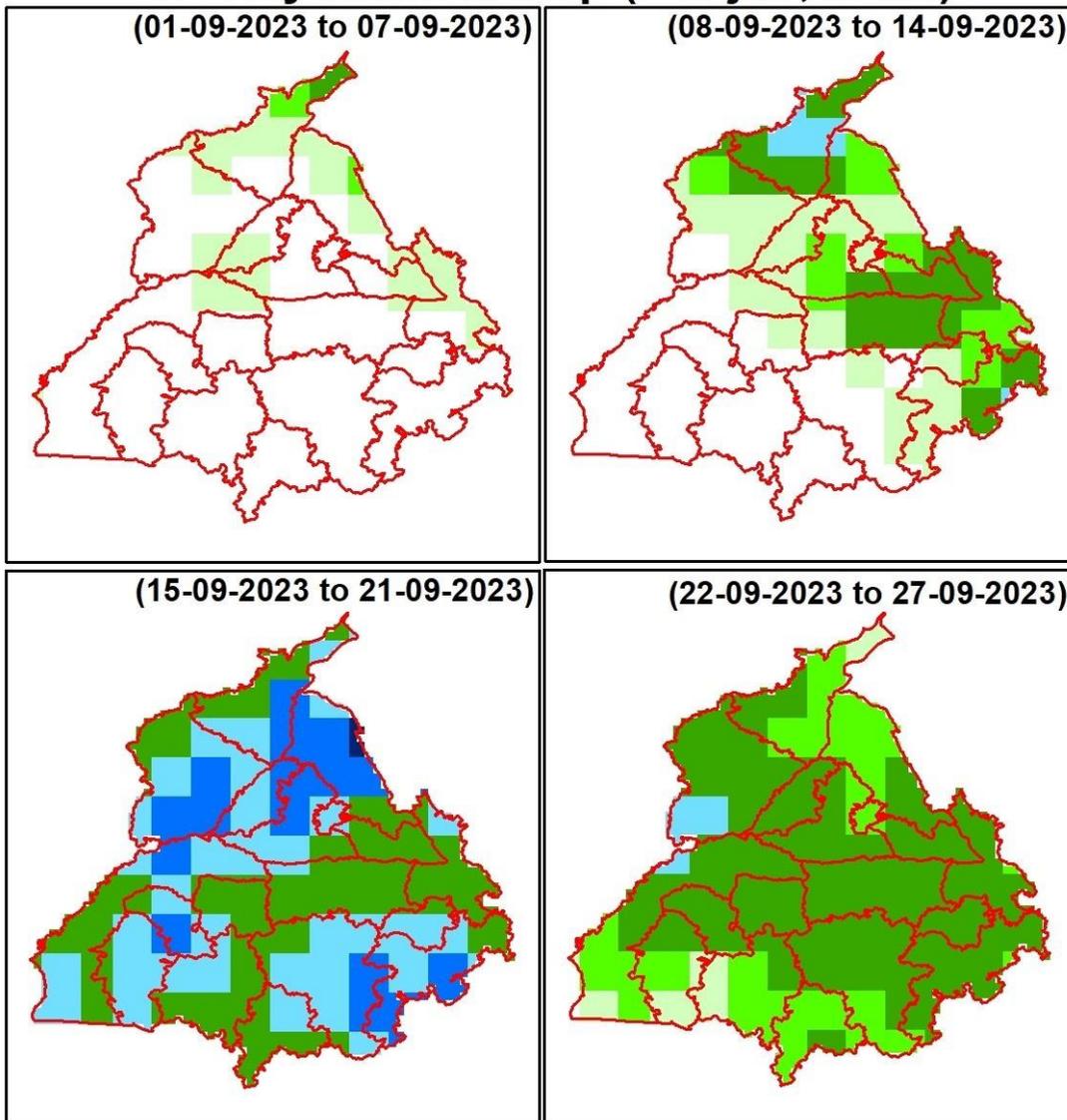
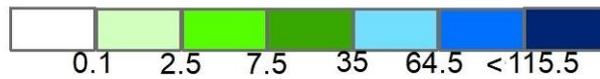


Fig. 11: Cumulative rainfall map starting from 1st June 2023

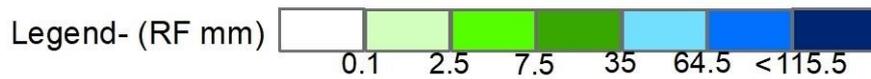
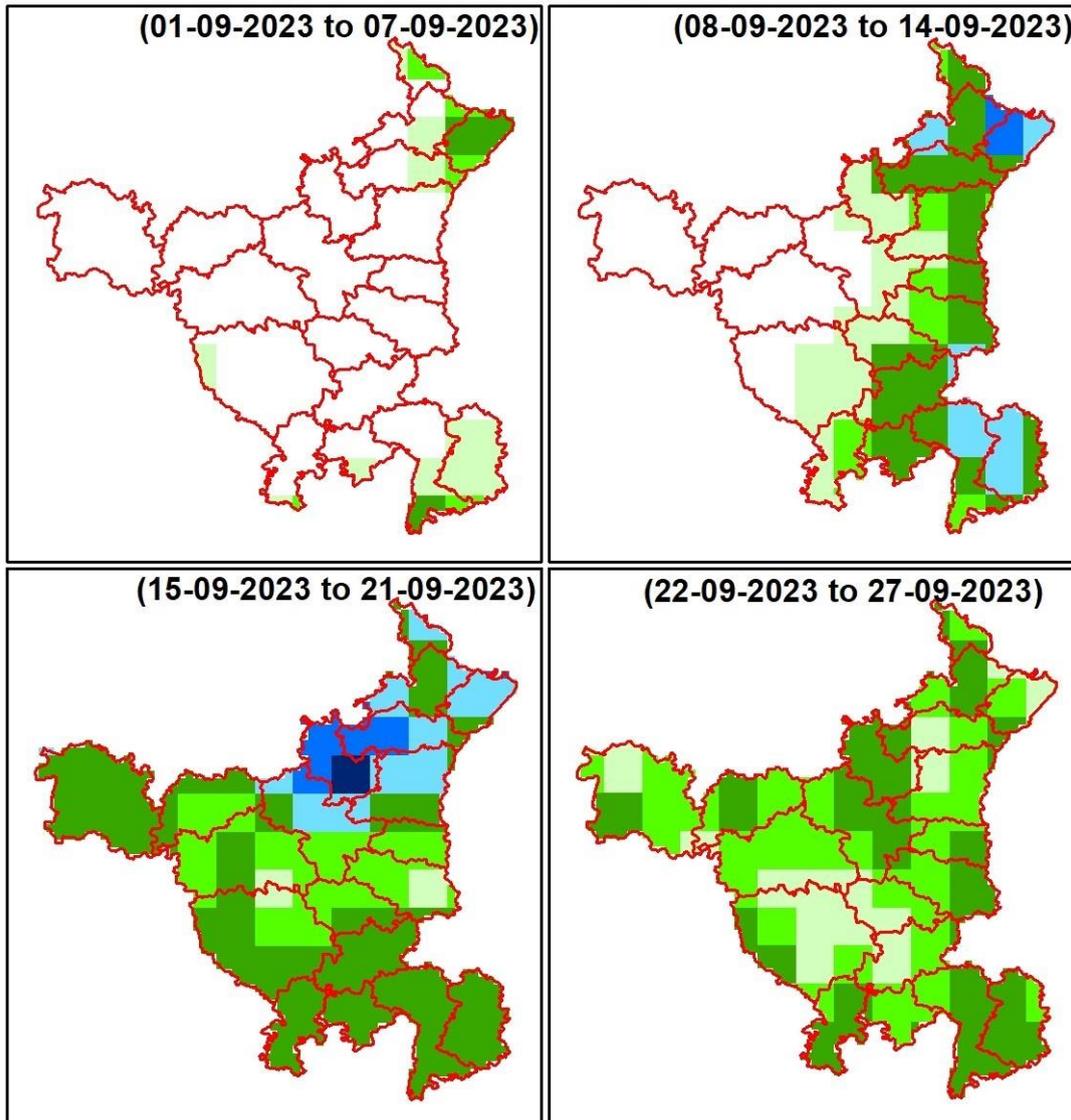
Weekly Rainfall Map (Punjab, India)



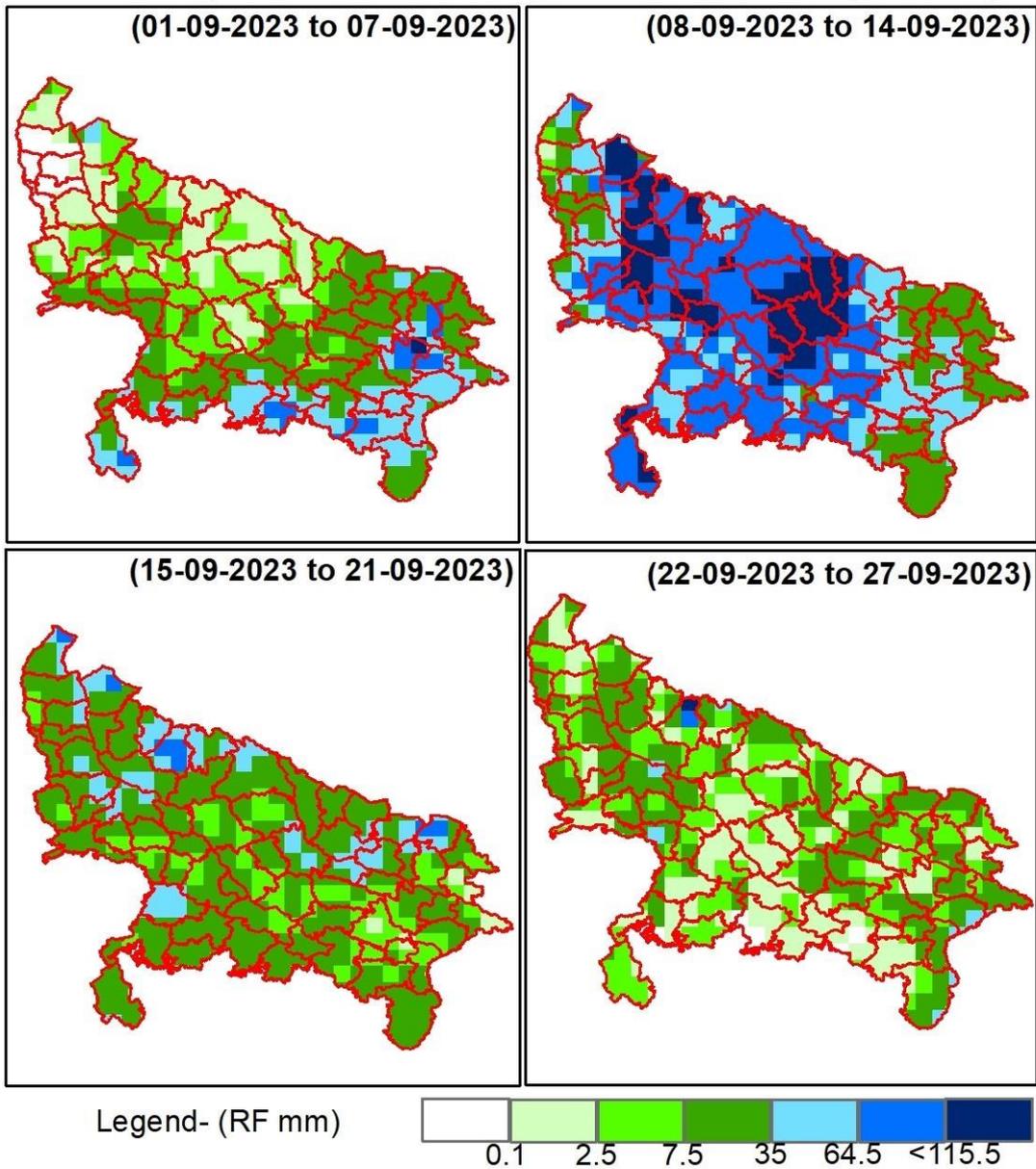
Legend- (RF mm)



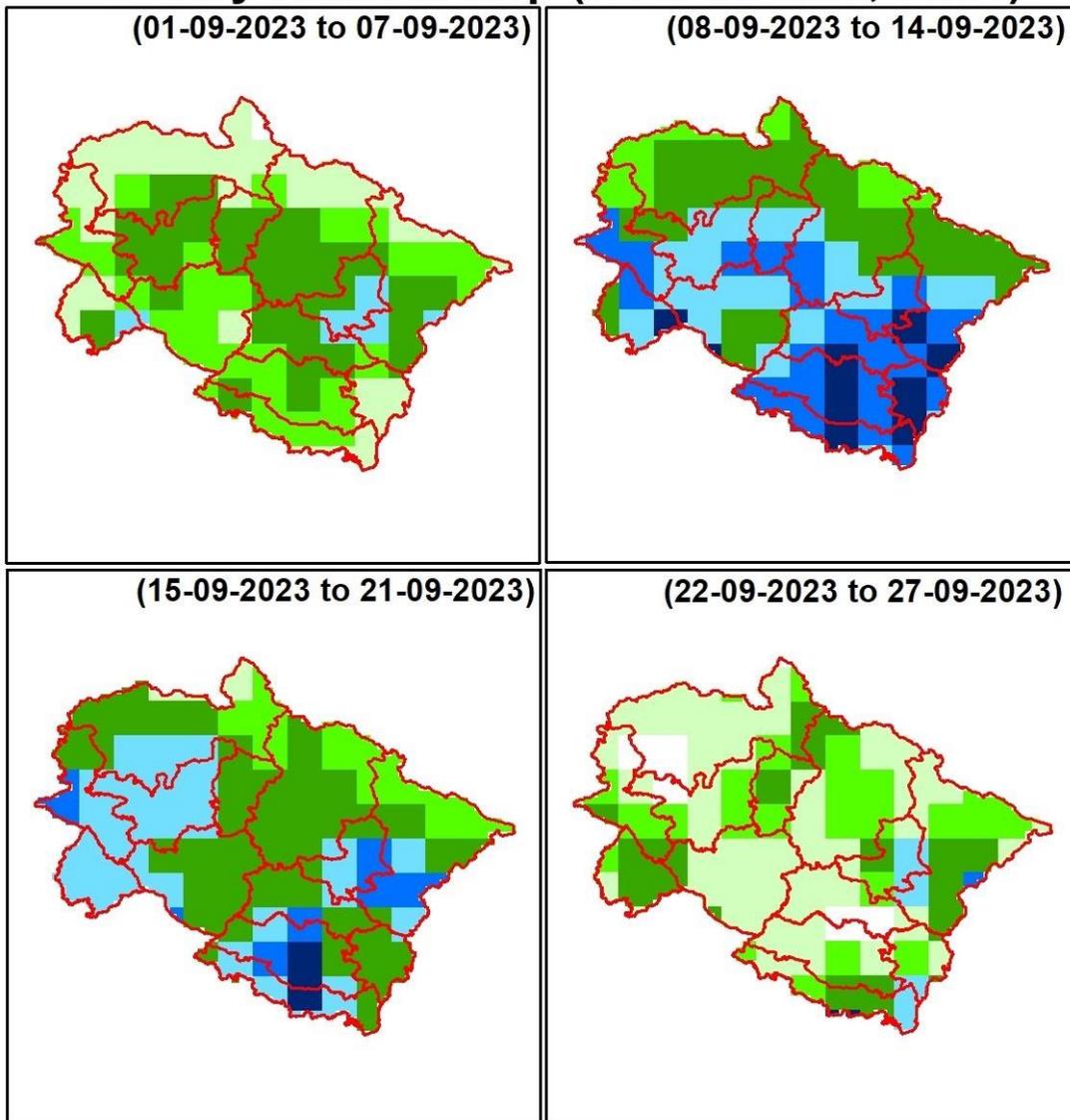
Weekly Rainfall Map (Haryana, India)



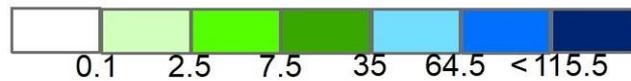
Weekly Rainfall Map (Uttar Pradesh, India)



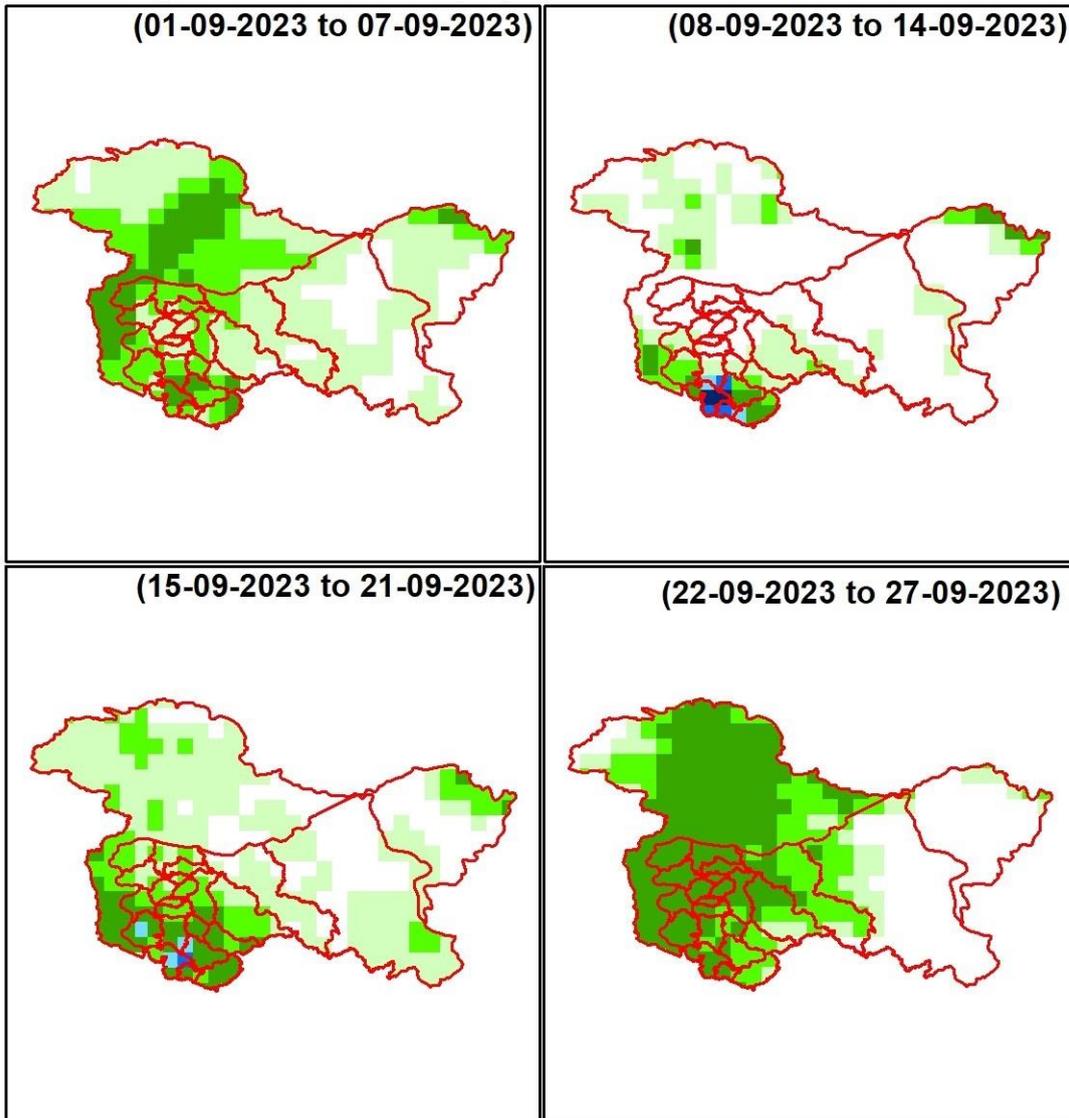
Weekly Rainfall Map (Uttarakhand, India)



Legend- (RF mm)



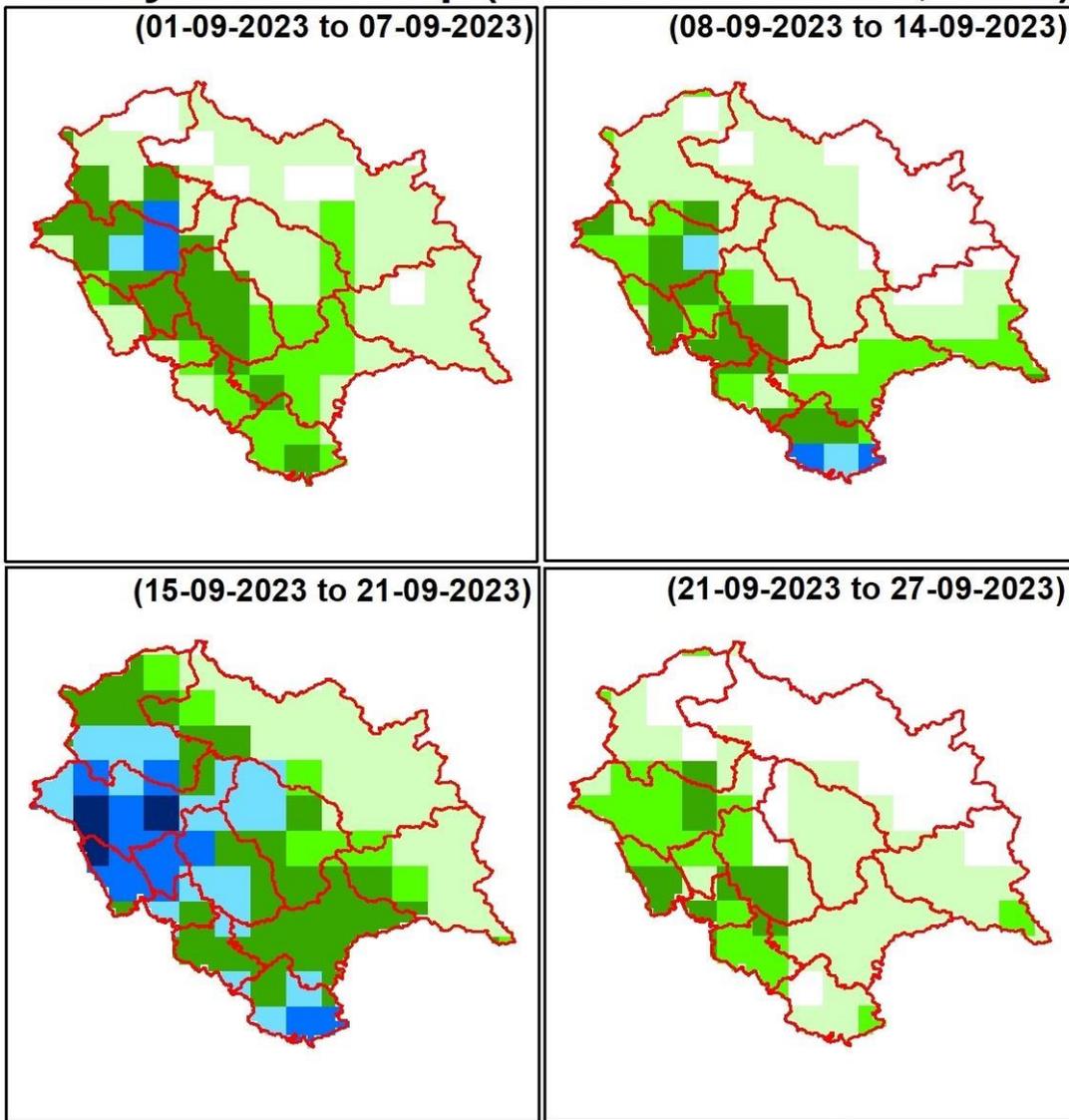
Weekly Rainfall Map (Jammu & Kashmir, India)



Legend- (RF mm)



Weekly Rainfall Map (Himachal Pradesh, India)



8. Field Survey:

For Field based Basmati acreage estimation third field visits were done from 21st July to 24th September 2023 covering majority of the districts in study area of Punjab, Haryana, Uttarakhand, J &K and Uttar Pradesh. During the field visit it is observed that major transplanting of Basmati varieties was done between 1st fortnight of July to 1st week of August. During the survey it was observed that the major sown Basmati varieties in study area are (PB1121, PB1718, PB1885), (PB1509, PB1692, PB1847), and (PB1401, PB01, PB06). Sugandha variety was observed in Aligarh, Kasganj and Sharbati variety majorly observed in Moradabad and Bijnor districts of Uttar Pradesh. Varieties (CSR 30, B370, HBC19) is mostly sown in J&K and Haryana.

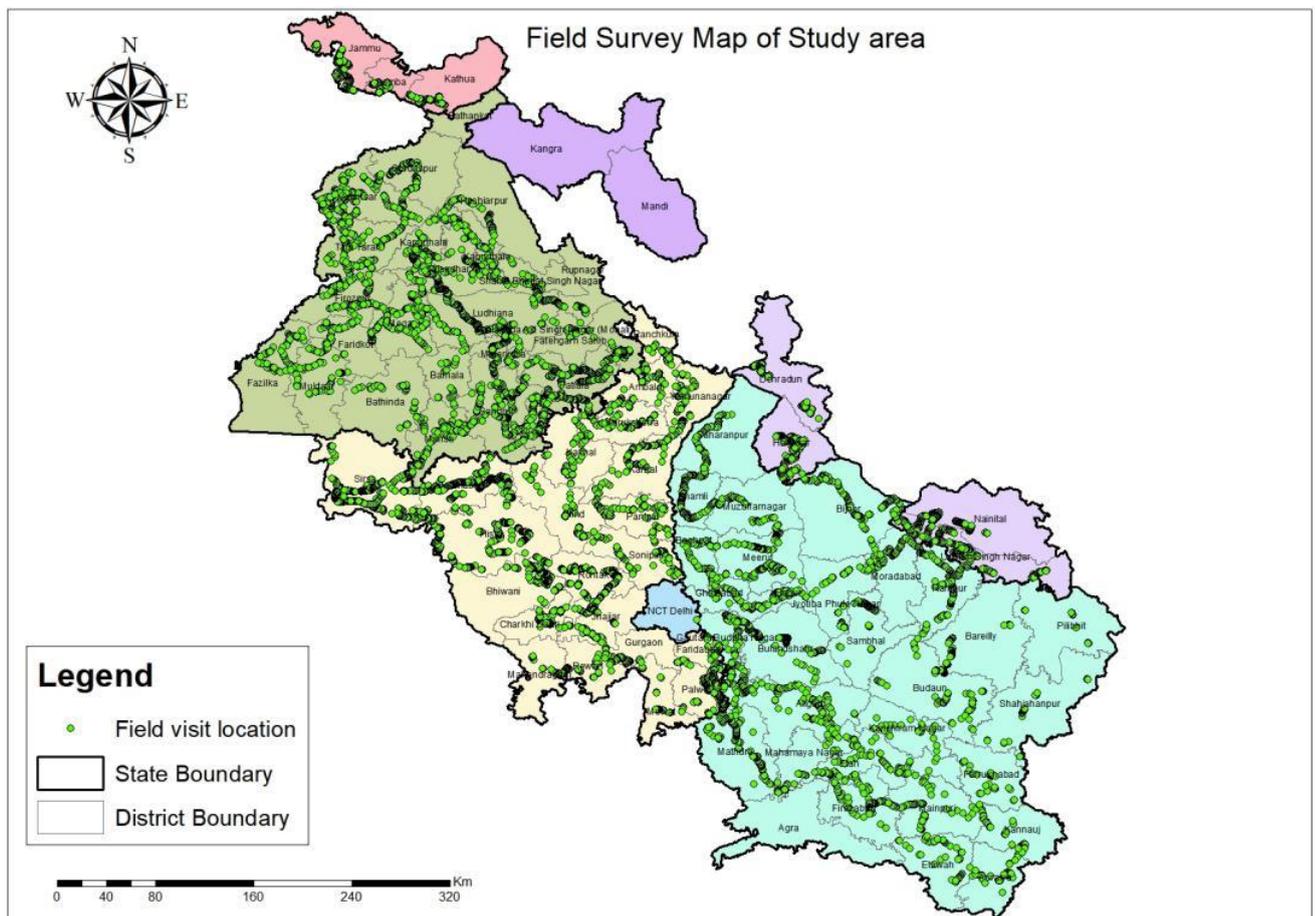


Fig. 12: Field Survey Points distribution in the study Area.

State wise field observations:

The state wise field observations on the basis of field survey can be summarized as below:

Punjab:

- Major transplanting of Basmati rice was observed in 1st and 2nd fortnight of July. .
- Major Basmati varieties observed are (PB1121,PB1718,PB1885), (PB1509, PB1692, PB1847) and (PB1401, PB01, PB06,PB 1886)
- In many districts a new variety PB1885 which is improved version of PB1121 is increasing in a distributed manner.
- In some part of Muktsar and Malerkotl traditional variety Basmati 386 (Pakistani Basmati) was also found.
- In Sangrur and Patiala districts Basmati area has been increased in comparison of last year.
- Basmati varieties of group (PB1509, PB1692, PB1847) were in ripening to Harvest stage while other groups (PB1121,PB1718, PB1885) and (PB1401, PB01, PB06) are in flowering to milk stage.
- Other crops like Sugarcane, Maize, Cotton and fodder were present in the field.
- Major Basmati rice area was found in Amritsar, Firozpur, Fazilka, Tarantaran and Muktsar district.
- No disease was observed in Punjab or below of the economically threshold. During field work it is also observed that farmers are using fungicides and insecticides actively.
- It is also observed that by replacing the cotton, Punjab state is seeing an increase in paddy acres.

Haryana:

- Major transplanting of Basmati rice was observed in first and second fortnight of July.
- Major Basmati varieties observed are (PB1121,PB1718,PB1885), (PB1509, PB1692, PB1847), (PB1401, PB01, PB06, PB1882) and (CSR 30, B370, HBC19).
- In some parts of Haryana state Sharvati variety were also seen. Basmati varieties (PB1509, PB1692, PB1847) are harvested or in ripening to Harvest stage while other groups (PB1121,PB1718,PB1885) and (PB1401, PB01, PB06,PB1882) are in flowering to milk stage.
- (PB1401, PB01, PB06) group varieties were primarily seen in Sirsa and Fatehabad..
- Other competing crops observed in field are Sugarcane, Sorghum (Jowar), Cotton and Bajra.
- Major Basmati sowing districts are Karnal, Kaithal, Sirsa and Hisar.
- In Haryana, Basmati crops were also affected by Nematode disease, Bacterial Leaf Blight, and Leaf Blast.

Uttar Pradesh:

- Major transplanting of basmati rice was observed in the first fortnight of July.
- Major Basmati varieties observed are (PB1509, PB1692, PB1847), (PB1121,PB1718, PB1885), (PB1401, PB01, PB06), Sharbati and Sugandha.
- Other crops like Jowar, Bajra, and Sugarcane were observed in the field.
- Major Basmati sowing districts are Hapur, Saharanpur, Mainpuri , Etawa , Bulandsahar and Gautambudh nagar.
- Harvesting of (PB1509, PB1692, PB1847) has been started in Uttar Pradesh.

• Punjab

Field Photographs collected during Field Survey:

Basmati Variety – PB 1121		
 Latitude: 31.771015 Longitude: 75.319719 Elevation: 43.90 m Time: 17-09-2023 09:34:59 Note: Basmati 1121	 Latitude: 31.771015 Longitude: 75.309209 Elevation: 43.90 m Time: 17-09-2023 09:19:03 Note: Basmati 1121	 Latitude: 31.400830 Longitude: 75.309819
 Latitude: 31.653222 Longitude: 75.713352 Elevation: 228.2045 08 m Accuracy: 6.50 m Time: 17-09-2023 09:49:09 Note: Basmati 1121	 Latitude: 31.550740 Longitude: 75.760988 Elevation: 227.9848 98 m Accuracy: 60.33 m Time: 17-09-2023 09:23:23 Note: Basmati 1121	 Latitude: 31.513279 Longitude: 75.710511 Elevation: 227.9211 38 m Accuracy: 64.56 m Time: 17-09-2023 09:54:00 Note: Basmati 1121
Basmati Variety – PB 1509		
 Latitude: 30.430332 Longitude: 76.274814 Elevation: 244.5012 03 m Accuracy: 6.50 m Time: 17-09-2023 09:14:26 Note: Basmati 1509	 Latitude: 31.164104 Longitude: 75.710511 Elevation: 228.76 182.89 m Accuracy: 4.00 m Time: 17-09-2023 09:37:01 Note: Basmati 1509	 Latitude: 31.556417 Longitude: 75.702098 Elevation: 228.8145 39 m Accuracy: 6.03 m Time: 17-09-2023 09:23:06 Note: Basmati 1509
 Latitude: 31.671021 Longitude: 75.771015 Elevation: 227.96 17.51 m Accuracy: 5.75 m Time: 17-09-2023 09:32:11 Note: Basmati 1509	 Latitude: 31.714477 Longitude: 75.712951 Elevation: 228.76 182.89 m Accuracy: 4.00 m Time: 17-09-2023 09:37:06 Note: Basmati 1509	 Latitude: 31.824010 Longitude: 76.018149 Elevation: 226.0213 33 m Accuracy: 6.78 m Time: 17-09-2023 09:38:10 Note: Basmati 1509
Basmati Variety – PB1401		
 Latitude: 30.810223 Longitude: 75.857150 Elevation: 227.96 17.51 m Accuracy: 4.82 m Time: 17-09-2023 10:06:20 Note: Basmati 1401	 Latitude: 30.739491 Longitude: 76.019608 Elevation: 215.2218 11 m Accuracy: 56.32 m Time: 17-09-2023 10:40:09 Note: Basmati 1401	 Latitude: 30.810223 Longitude: 76.059847 Elevation: 226.0213 33 m Accuracy: 6.78 m Time: 17-09-2023 10:06:50 Note: Basmati 1401
 Latitude: 30.810223 Longitude: 75.857150 Elevation: 227.96 17.51 m Accuracy: 4.82 m Time: 17-09-2023 10:06:20 Note: Basmati 1401	 Latitude: 30.792098 Longitude: 75.710511 Elevation: 227.9848 98 m Accuracy: 43.59 m Time: 17-09-2023 10:30:13 Note: Basmati 1401	 Latitude: 30.810223 Longitude: 76.059847 Elevation: 226.0213 33 m Accuracy: 6.03 m Time: 17-09-2023 10:34:36 Note: Basmati 1401
Basmati Variety – PB1718		



Basmati Variety - PB1692



Basmati Variety - PB1885



Basmati Variety - PB1886



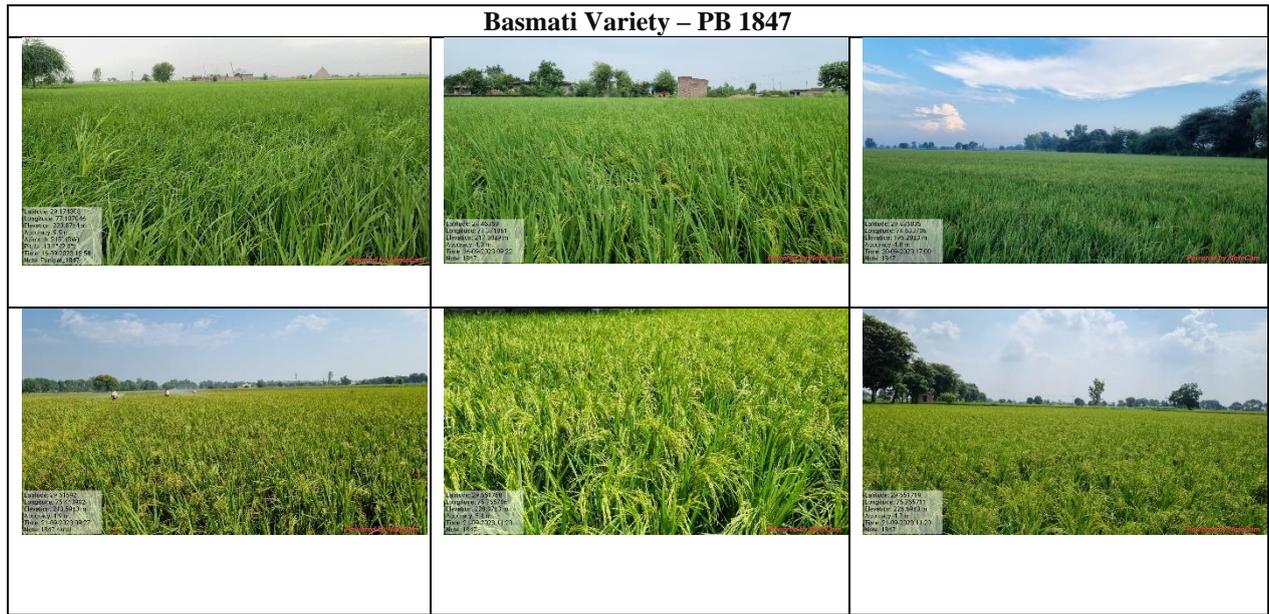


Note: These Photographs are from different parts of the region. Each photograph is with their Geo-tag details with their Latitude and Longitude.

• Haryana

Field Photographs collected during Field Survey:





Note: These Photographs are from different parts of the region. Each photograph is with their Geo-tag details with their Latitude and Longitude.

• Uttar Pradesh

Field Photographs collected during Field Survey:





Basmati Variety - PB1692



Basmati Variety - Sharbati



Basmati Variety - PB1847



Note: These Photographs are from different parts of the region. Each photograph is with their Geo-tag details with their Latitude and Longitude.

9. Schedule wise Report Status:

The present report is the third volume of reports to be delivered. This report covers district level variety wise Basmati area, and field survey-based production details. The status of Schedule wise report status is being given for the reference below.

Report Schedule				
S. No.	Report	Report Content	Submission Date	Status
1	1 st Report	District wise total rice area (Basmati + Rice) Basmati seed sale distribution (in percent)	30th July 2023	Submitted
2	2 nd Report	Basmati rice acreage and health monitoring	31st August 2023	Submitted
3	3 rd Report	Basmati rice acreage estimation (Variety wise evolved Sarbat and Sugandha)	30th September 2023	Submitted
4	4 th Report	Climate based Basmati rice yield model and production	31st October 2023	In Process
5	5 th Report	Questionnaire based farmer survey report of Basmati rice	30th November 2023	In Process
6	6 th Report	Final Report (All statistics and maps)	30th December 2023	In Process

Note: The green highlighted row shows report is submitted.